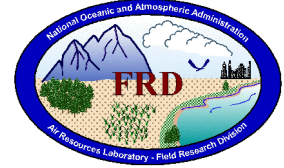


FRD Activities Report January 2004



Research Programs

SF₆ Fugitive Source Survey of New York City and Washington, DC

A survey of potential fugitive sources of SF₆ and interferants was conducted in New York City, New York on January 20-23. The survey consisted of driving a van instrumented with an SF₆ real-time analyzer along the streets of midtown Manhattan. The survey was conducted on several days together with one nocturnal surveillance study. Two major sources of SF₆ were discovered, both of which were large electrical substations. To ensure that the real-time analyzer had, indeed, measured SF₆ and not some other SF₆ interferant, several bag samples were acquired from the plume immediately downwind of the substations. These bag samples were later analyzed in the FRD Tracer Analysis Facility, where it was determined conclusively that the compound being emitted from the substations was SF₆. No other sources of SF₆ or SF₆ interferants were measured in NYC.

A similar survey was conducted in Washington, D.C. on January 26-28. Three sources of SF₆ were identified in the area of the White House and the U.S. Capitol. None were discovered in the area of the Pentagon.

The results of these surveys indicate the potential of using existing sources of SF₆ as a source of opportunity when conducting an atmospheric tracer study. In fact, had a full tracer experiment been conducted with a fully deployed complement of bag samplers and real-time analyzers on the night of the nocturnal survey in NYC, the test would have mimicked the intentional tracer releases in Oklahoma City from the summer of 2003. The results also indicate that the SF₆ sources can be sufficiently managed to permit successful intentional releases of SF₆ without the fear of ambiguous tracer sources convoluting the concentration data. (Kirk.Clawson@noaa.gov)

CBLAST-High

Work continues on the analysis of data collected during six research flights in Hurricanes Fabian and Isabel last September. Two extended abstracts are being prepared for the upcoming 26th Conference on Hurricanes and Tropical Meteorology to be held in Miami in May of this year. One abstract focuses on the data collected and includes comparison of wind and temperature measurements obtained from the BAT with data from the standard suite of P-3 instruments. Further analysis explores co-spectra estimates and cross-spectral analysis. A second abstract discusses the evolution of the BAT probe from an instrument used to obtain flux measurements on small, slow flying aircraft in relatively benign environments to one installed on a P-3 and used to obtain fluxes in hurricane boundary layers. Several changes to the design of the probe were required and have been discussed in earlier reports.

The BAT probe and data system were removed from the P-3 and returned to FRD in early January. The system is currently 'on the bench' and will undergo some upgrades to both the hardware and software before the upcoming hurricane season.

A meeting of CBLAST PIs is scheduled to take place in Miami in mid-February. The meeting will focus on analysis of data collected last summer and plans to publish data in reviewed literature. Discussions will also focus on upcoming field campaigns, which need to include additional funding for the BAT (currently our funding only includes data analysis in 2004). Further discussion will evolve around possible follow-on to CBLAST. (Jeff.French@noaa.gov).

CBLAST-Low

A new method was developed to compute wave phase speed using wave height data obtained from three lasers mounted on an aircraft. The method does not require two flux legs in opposite directions, as was previously thought, to determine the true frequency. All wave parameters can be determined from one flux leg as long as time-series data from three lasers are available. The method is an extension of the work of Sun et al. (2003, in review) where they use two phase differences (the phase difference between lasers 1 and 2 and the phase difference between lasers 2 and 3) to compute the wave propagation direction and the true wave number (versus the encounter wave number) given the aircraft heading. Then knowing the aircraft heading, ground speed, and the peak encounter frequency, the wave phase speed can be computed. The wave age can then be computed from the wave phase speed and the friction velocity. (Tami Grimmer, Jeff.French@noaa.gov)

ET Probe

A draft extended abstract describing progress on the ET probe was completed in January. It is undergoing internal review, and the final version will appear in the preprints of the 26th Conference on Hurricanes and Tropical Meteorology. This conference is scheduled for early May in Miami. (Richard.Eckman@noaa.gov)

The sponsors of the CBLAST program have scheduled a planning meeting in Miami for the middle part of February. Part of the ET probe funding comes from CBLAST, so a short presentation on the probe is planned for this meeting. It would be more cost effective if the planning meeting were held at the same time as the Conference on Hurricanes and Tropical Meteorology, since the CBLAST participants will likely attend both events. However, the May time line for the conference is too late for some of the CBLAST planning. (Richard.Eckman@noaa.gov)

JOINT URBAN-2003

The focus of activities for this month has been preparation of final data files that will be released to the project archive. The data from the Programmable Integrating Gas Samplers (PIGS) was converted into final output files, one file per IOP. Once the final files were generated, a time history plot of the SF₆ concentrations for each location was generated. These were examined for

inconsistencies or problems. The files are now ready for a final review before being sent to the data archive. A complete report on the QC procedures used during the project has been prepared and will be submitted with the data. An expanded description of the data and QC procedures is being prepared for inclusion in the project report.

The data from the real-time analyzers has also been converted to final output files. The generated files have been reviewed by plotting every column in the 390 data files and visually examining them for inconsistencies. The final step before the real-time analyzer data is complete is the insertion of pass numbers into the files for the mobile analyzer. The data will then be sent to the archive after a final review. A complete QC report has also been generated for these data and will be submitted with it. A description of the real-time analyzer data and QC is being generated for inclusion in the project report. (roger@noaa.inel.gov, Debbie Lacroix, Neil Hukari)

BAT Probe Development

Work was completed on the new all aluminum version of the BAT probe. The probe body is three separate pieces that are designed to be interchangeable from probe to probe. The interface piece (specific for a given install) and the hemisphere (Figure 1) are machined from a solid rod of 2024 aircraft aluminum. The electronics cylinder, replacing the fiberglass cone, is machined from an extruded tube of 2024 aluminum. This version is designed to replace the standard fiberglass BAT for installations that require a more robust probe, such as for the P-3 install in CBLAST-High. The aluminum version increases the overall weight of the instrument from 6.6 lbs to 13.2 lbs., including electronics and wiring. The aluminum hemisphere is designed in such a way that it may still be mounted on a fiberglass cone for only a moderate increase in weight (roughly 1 lb) while still providing a significantly more robust sensor as the hemisphere is the portion most sensitive to damage.

The probe shown in Figure 1 was developed for the British Antarctic Survey. BAS will mount this particular probe on a Twin Otter. (Jeff.French@noaa.gov)

ARL Aircraft

Progress continues (slowly) on the acquisition of a SERA aircraft to replace the LongEZ. An initial draft of an A-76 study, completed through a contract to Conklin and deDecker, was completed in mid-January. Several



Figure 1. Images from the new all aluminum BAT probe. Top center shows the cylinder, BAT-REM and hemisphere, center shows interface piece (left) and inside of cylinder (right), bottom shows assembled probe.

shortcomings in the draft were noted by AOC managers. These shortcomings are currently being addressed by AOC, ARL and C&D persons involved with this study.

Lt. Phil Hall is continuing to investigate the costs associated with engineering and testing for the airframe modifications to the Velocity aircraft. A number of possible sources to help with this issue have been identified. We are at present developing a working plan to determine engineering and testing requirements so that a realistic costs analysis can be performed (Jeff.French@noaa.gov).

Cooperative Research with INEEL

Emergency Operations Center (EOC)

The annual round of EOC requalification exercises has started at the EOC. On the afternoon of 28 January, the two FRD members of EOC Team D attended one of these exercises. Two of the three NOAA computers in the EOC had network connectivity problems during the exercise, and could not be used for their normal purposes. However, the third computer uses an independent link to the Internet and was working normally; it was used to provide the expected meteorological support for the exercise. (Richard.Eckman@noaa.gov, Debbie Lacroix)

INEEL Support

January normally sees an increase in INEEL support activities as requests start coming in for Mesonet data from the prior calendar year. One of the requests that was handled during the month was for joint frequency distributions of the 2003 Mesonet winds. These distributions bin the observed winds by direction, speed, and stability class. FRD also received a request for a five-year data subset from the Grid 3 tower. The extraction of this subset will be completed in early February. (Richard.Eckman@noaa.gov)

INEEL Mesoscale Modeling

The new MM5 simulations continued to run reliably through January on a Linux workstation. Output from these simulations is currently limited to internal distribution within FRD. The public interface to FRD MM5 simulations is still coming from a different MM5 configuration on an older Alpha workstation. Given the reliability of the new simulations on the Linux computer, it is expected that the Alpha-workstation simulations will be deactivated in the near future, and the public interface will be shifted to the new simulations. The new simulations include many enhancements over the old ones, including initialization from higher resolution Eta-model output and more use of data assimilation. (Richard.Eckman@noaa.gov)

Other Activities

Visits with Idaho's Congressional Representatives

While in Washington, DC to conduct the SF₆ fugitive source survey described above, Kirk Clawson met personally with Idaho's two congressmen, Mike Simpson and Butch Otter. He also met Senator Larry Craig's chief of staff. The meetings were arranged by Kirk's father-in-law, Ralph Harding, a former congressman from Idaho himself. The congressmen were briefed on the purpose of the Washington trip.

Papers

- Eckman, Richard M., Ronald J. Dobosy, Thomas Strong, and David L. Auble. 2004. Development and Initial Deployment of an Omnidirectional Pressure-Sphere Anemometer for Observing Winds and Turbulence in Tropical Cyclones. To appear in preprints, *26th Conference on Hurricanes and Tropical Meteorology*, Am. Meteorol. Soc., Boston, MA. May 3-7, 2004.
- French, J. R. and P. G. Black. 2004. Turbulent flux measurements within a hurricane boundary layer from an instrumented aircraft. To appear in preprints, *26th Conf. On Hurricanes and Tropical Meteorology*, Am. Meteorol. Soc., Boston, MA. May 3-7, 2004.
- French, J. R., R. Johnson, S. Beard, T. L. Crawford. 2004. Modification of an airborne gust probe for hurricane boundary layer measurements. To appear in preprints, *26th Conf. On Hurricanes and Tropical Meteorology*, Am. Meteorol. Soc., Boston, MA. May 3-7, 2004.

Training

Kirk Clawson attended the one-day IOSA training provided by NOAA to introduce the new internal procedures for processing incoming reimbursable funds. The training included procedures for preparing agreements for the Economy Act, joint projects, special studies, Intergovernmental Cooperation Act agreements, and Coasts and Geodetic Survey Act agreements. All reimbursable funds must now go through DOC/NOAA legal review and must include the appropriate agreement.

Travel

Kirk Clawson on January 13-14 to Boulder, CO for Interagency and Other Special Agreements (IOSA) Training provided by NOAA.

Kirk Clawson on January 15-31 to New York City, NY and Washington, DC for SF₆ fugitive source survey.

